Outcomes of Weight Loss During Induction Therapy During Childhood ALL

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INTRODUCTION

Acute lymphoblastic leukemia (ALL) is the most common childhood cancer. Therapy involves multiple phases such as induction, consolidation, interim maintenance, delayed intensification and then a longer term maintenance phase. Pediatric patients with ALL and lymphoblastic lymphoma (LLy) often experience significant weight gain (≥5% weight gain) during remission induction therapy. However, some experience significant weight loss (≥5% weight loss) instead.

There are several factors associated with a decrease in body mass index (BMI) during therapy: high/very high risk stratification, being overweight/obese at diagnosis, trisomy 21, and hyperglycemia. It is important to monitor malnutrition due the potential outcomes of decreased survival, infection risk, and rapid loss of lean body mass.

The purpose of this study is to determine whether significant weight loss during induction therapy decreased the likelihood of reaching end of therapy (EOT) or increased risk of death or relapse in these patients.

METHODS

- Retrospective chart review of pediatric patients diagnosed with ALL or LLy at Cook Children's Medical Center (CCMC) from 1/1/11 to 3/31/17.
- Inclusion criteria:
  - ≥2 years of age at diagnosis and <20 years of age by day 1 of consolidation
- Exclusion criteria:
  - If induction was not completed at CCMC
  - If patients were not treated according to the following COG protocols: AALL0331, AALL0232, AALL0434, AALL0932, AALL1131, AALL1231, AALL0622, AALL1122
- Percent weight change from diagnosis to end of induction was grouped: loss (≥5% weight loss), gain (≥5% weight gain), and steady (<5% weight loss/gain).
- Data was collected regarding the following outcomes (if applicable):
  - Death
  - Relapse
  - Whether end of therapy (EOT) was reached
- To examine outcomes of weight loss, logistic regression was used for reaching EOT and Cox regression for death and relapse.

RESULTS

- There were 187 patients included in the study. Weight-change categories:
  - 17% loss
  - 39% steady
  - 45% gain
- Outcomes Data:
  - Relapse: 22 patients (12%)
  - EOT Not Reached: 18 patients (10%)
  - Death: 10 patients (5%)
- Compared to patients in the steady category, patients who lost weight were significantly less likely to reach EOT.
- Though nonsignificant, the odds ratio demonstrated increased risk of death and relapse, but this did not reach significance.
- Patients in the steady and gain groups did not significantly differ in any outcomes of EOT, death, or relapse (p>0.05).

	Loss vs. Steady		Gain vs. Steady	
Variable	**OR/HR (95% CI)**	**p**	**OR/HR (95% CI)**	**p**
End of Therapy[a]	0.31 (0.16, 0.63)	0.001	1.98 (0.95, 4.11)	0.067
Death[b]	3.67 (0.81, 16.52)	0.090	0.81 (0.16, 4.03)	0.799
Relapse[b]	1.83 (0.60, 5.60)	0.291	0.93 (0.36, 2.40)	0.876
Event[b]	1.93 (0.68, 5.43)	0.214	0.82 (0.33, 2.07)	0.676

OR/HR, odds or hazard ratio; 95% CI, 95% confidence interval; P, P-value; Dx, diagnosis.
[a]Logistic regression
[b]Cox regression

CONCLUSION

This research demonstrates that patients who experience malnutrition during induction therapy may be at greater risk for not completing therapy. Those in the loss group had higher mortality rates (13%) than did those in the steady or gain (4%) groups; and a larger sample may have produced a significant effect for death. Therefore, further study is necessary to determine if weight loss during induction therapy should be considered for additional nutritional interventions, as well as the long-term impact of early malnutrition during therapy. It is our goal that this information can be used for future studies and to help develop evidence-based guidelines to modify existing treatment plans.

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ACKNOWLEDGEMENTS

This study was conducted as part of the University of North Texas Health Science Center and Cook Children's Pediatric Research Program (PRP).